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International application number: PCT/US2005/045277

International filing date: 14 December 2005 (14.12.2005)

Document type: Certified copy of priority document

Document details: Country/Office: US  
Number: 60/636,014  
Filing date: 15 December 2004 (15.12.2004)

Date of receipt at the International Bureau: 03 March 2006 (03.03.2006)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



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APPLICATION NUMBER: 60/636,014

FILING DATE: *December 15, 2004*

RELATED PCT APPLICATION NUMBER: *PCT/US05/45277*

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Express Mail Label No.

## INVENTOR(S)

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Additional inventors are being named on the \_\_\_\_\_ separately numbered sheets attached hereto

## TITLE OF THE INVENTION (500 characters max)

## STACKED CARGO SECURING DEVICE AND METHOD OF USE

Direct all correspondence to:

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Customer Number:

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## ENCLOSED APPLICATION PARTS (check all that apply)



Specification Number of Pages

12



CD(s), Number



Drawing(s) Number of Sheets

4



Other (specify)



Application Data Sheet. See 37 CFR 1.76

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Yes, the name of the U.S. Government agency and the Government contract number are: \_\_\_\_\_

Respectfully submitted,

(Page 1 of 2)

Date December 15, 2004

SIGNATURE

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## STACKED CARGO SECURING DEVICE AND METHOD OF USE

### Field of Invention

The present invention is directed to a stacked cargo securing device, and particularly a device designed to interface with portions of stacked cargo to resist forces, particularly lateral forces, applied to the cargo during transport.

### Background Art

In the prior art, it is well known to secure loads being transported on a carrier such as a pallet or other support structure, a flat bed trailer using tensioned flexible members that secure the loads to the carrier. This is particularly so when transporting lumber, pipes, and the like. In these arrangements, one or more belts are draped over the load or between stacked loads. One end is usually attached to the carrier first, with the other end subsequently attached. The belt is then appropriately tensioned to hold the load in place. Figure 1 shows a typical arrangement for securing stacked cargo, wherein load pairs 1, 3, and 5 are stacked on a surface 7 of a support structure or carrier 9. Belts 11 are interleaved between loads 3 and 5, with the end of the belt 13 secured to the carrier at winch mechanism 15 in a conventional fashion. Although not shown, the same attachment is made on the other side of the carrier 9. Although not shown, additional belts could cross over the top of the load pairs 5.

One significant failing in the transport of multi-tiered or stacked items is their susceptibility to shift relative to each other due to acceleration forces experienced during transport. Such shifting may result in the stacked items to be unsecured, and fall off the carrier. This problem is especially acute for intermediate tiers in a stack of three or more items as shown in Figure 1. Although this prior art method of securing improves the stability of the intermediate items, these items are only marginally secured by frictional contact with the items above and below, still making them susceptible to lateral shifting movements in response to the lateral acceleration forces experienced when mounted to a vehicle making a sharp corner or mounted on a boat encountering rough water.

Thus, there is a need to provide improved devices and methods to better secure loads during transport. The present invention responds to this need by providing a load

securing device that effectively resists loads, and particularly lateral loads that may arise during the transport of stacked items.

#### Summary of the Invention

5 It is an object of the invention to provide an improved device for securing stacked items during transport.

Another object of the invention are load securing devices designed to engage the sides of stacked loads or items and provide resistance to forces that may occur during transport of the loads or items.

10 One other object of the present invention is a method of securing one or more sets of stacked loads or items by providing devices configured to hold the stacked loads at side portions thereof during their transport.

Yet another object of the invention is a load securing device subcombination, wherein the device is used with existing rings and belts or straps.

Other objects and advantages will become apparent as the description proceeds.

#### 15 Brief Description of the Drawings

Figure 1 is a perspective view of a prior art technique for securing stacked cargo;

Figures 2 and 3 show perspective views of stacked cargo employing the invention;

Figure 4 shows an enlarged and partial view of Figure 2;

20 Figures 5a and 5b show top and side views respectively of the securing device of the invention; and

Figure 6 is an enlarged perspective view of the load securing device with ring and belt.

#### Description of the Preferred Embodiments

25 The invention provides a significant improvement in the ability to transport stacked items on a carrier such as a truck or other vehicle, or an intermediate carrier such as support structure adapted to be used with a vehicle, e.g., a pallet or the like. Unlike prior art methods which generally only apply a resisting force on the top of the stacked items and minimal lateral force resistance, the invention allows a resisting force

to be applied to sides of the stacked items. This arrangement provides far superior ability to stabilize the stacked items during their transport.

One embodiment of the invention is shown in Figures 2-6. Referring specifically to Figure 5a-6, the load securing device comprises a body 20 having first and second portions 21 and 23. Each portion has a generally flat surface 25 and 27. The body 20 also includes a rib 29 having first and second segments 31 and 33, the rib running longitudinally along the body 20 and generally perpendicular to the surfaces 25 and 27. The rib provides strength to the body and surfaces 25 and 27 during use of the device as explained below. The body 20 interfaces with a ring 35 and belt 37 to secure the stacked loads as described in more detail below.

Referring particularly to Figure 6, the body 20 has a notch 34 separating the rib segments 31 and 33 and body portions 21 and 23. The notch 34 is adapted to receive a corner portion of the triangular-shaped ring 35. Another portion of the ring is attached to the belt 37 using looped end 38. In concert with the notch, edges 36 are formed at the termination of body portion 23 the edges 36 acting as a stop against movement in direction "A". This arrangement keeps the ring 35 linked or secured to the body 20, and limits rotation of the ring 35 about the notch to further enhance the holding power of the device. To facilitate securement of the ring 35 to the body 20, the rib segment 31 and body portion 21 have respective widths that are less than their counterparts 33 and 25. This allows the ring 35 to slide along body portion 21 and rib segment 33 and engage the notch 34 and edges 36. While a triangular ring 35 is shown, other shapes can be used to link the belt 37 to the body 20. Moreover and while the stop configuration is preferred to help stabilize the loads, the ring could be linked to the body 20 in a freely rotatable manner if so desired, e.g., use just the notch or another securing means as detailed below.

Each of the rib segments 31 and 33 and body portions 21 and 23 can have openings 28 to make the body lighter in weight. However, the openings are optional, and the body could be made of high strength and light material if so desired that would not need the openings. In fact, the body 20 can be made out of any material having sufficient strength to resist forces when applied thereto during use, e.g., high strength

aluminum alloys, titanium or titanium alloys, composite materials and the like. If the material is strong enough, the rib could be optional.

The configuration of the notch 34, edges 36, rib segments 31 and 33, and body portions 21 and 23 function as a means for securing the ring 35 to the body 20, but the disclosed embodiment should be considered exemplary in this regard. For example, the ring 35 could be permanently secured to the body 20 if so desired. Alternatively, it could be attached to openings in one of the rib and/or body portion rather than be secured in the slip fitting fashion described above. In fact, virtually any type of securement whether it is a removable type as illustrated or a more permanent type that would use the ring, or the ring and the belt could be employed. It is preferred that the body 20 be adapted for removable securement to the ring 35 since the ring 35 and belt 37 are readily available due to their common use to secure loads using the prior art techniques shown in Figure 1. Thus, one only needs to have the body member and its means for securing the ring thereto in order to use it in its novel way when rings and belts are available.

Referring to Figures 2-4, the load securing device is illustrated in use. The load pairs 1, 3, and 5 of Figure 1 are depicted in Figure 2 with four load securing devices 20, two shown, with two others on the other side and not shown. A ring 35 is shown secured in the notch 34 of each body 20, with the belt 37 attached to a respective ring interleaved between the load pairs 3 and 5.

In Figures 2-4, the belts 37 that have one end attached to the hidden bodies 20 is shown. The other free end of the belt is secured to the carrier at a given winch mechanism 15 (not shown). The winch mechanism 15 is tightened to tension the belt 37. With this tightening, the body portion 23 of the body 20 member not shown is pressed against the side portion of the load 5, with the body portion 21 pressed against the side of load 3. This same procedure would be repeated with the depicted load securing devices, wherein the hidden winch mechanism is tightened to tension the belt (not shown) so that the depicted body 20 is laterally forced against the sides of the loads 3 and 5. With a pair of securing devices as the body 20 and its means to attach to the ring 37 are mounted on each side of the load pairs 3 and 5, see Figure 2, lateral forces applied to the loads are effectively restrained.

While load pairs 1, 3, and 5 are shown in Figures 2 and 4, other loads can be secured using the load securing device. Figure 3 shows an alternative use wherein tubular items 40 as the load are secured. The loads that are stacked could be unitary loads wherein a single load is stacked upon another load. Alternatively, each stacked  
5 load could be made up of two or more items, e.g., the load pairs of Figure 2, or the bundles of pipe in Figure 3.

In the exemplified uses, the load securing device is used on either side of the stacked load pairs 1, 3, and 5. However and although the device is exemplified to resist lateral loads, it could be employed to resist movement front to back on a vehicle or other  
10 support structure. In this mode, the devices could be employed to contact front and rear portions of cargo, rather than or in addition to the opposing side portions as illustrated in the drawings. In yet other uses, any number of load securing devices can be used in horizontal combination, e.g., in two pairs to resist lateral forces as shown in Figures 2 and 3. In addition, the devices could be employed vertically to secure a number of  
15 stacked items or loads, e.g., interleaving between first and second stacked loads, between second and third stacked loads, and/or between third and fourth stacked loads. Further yet, a combination of vertical and horizontal positioning of the devices could be employed if the stacks of cargo were sufficiently long and high enough to warrant the use of the plurality of load securing devices.

While a separate structure is exemplified as the carrier for transporting the stacked items, virtually any type of a carrier, whether it is a vehicle itself that travels on water, air or ground, or is a support structure to be mounted to the vehicle is adaptable for the invention. As long as the carrier has a surface to support the stacked items, and has structure either as part of the carrier or in proximity to the carrier so that it can hold  
20 one end of the flexible member, e.g., the belt, can be used in conjunction with the invention. Likewise, the stacked items can be any shape and any type, just as long as the stacked items have a space between them to allow for travel of the flexible member.

While a belt is exemplified as one type of flexible member, virtually any type that would allow the winch mechanism or other device to provide tension for securing  
30 purposes could be used. For example, more rigid flexible members such as cables or chains could be employed as long as some tensioning device or means is present to



ensure that the connection between the body 20 and the carrier is tensioned for transport.

It should also be understood that although the body 20 is formed in an elongate shape, other configurations could be employed, square, oval, etc. In addition, the proportions of the first and second portions 21 and 23 could be modified depending on the required application. While the dominant portion of the body 20 is shown as 21, portion 23 could be dominant, or both portions could be equal, with the notch bisecting the body 20. While it is preferred to have the body 20 with generally flat surfaces 25 and 27 to maximize contact with the side portions of the loads, the surfaces 25 and 27 could have raised protrusions or other friction enhancing features if so desired.

In an alternative use, if the cargo is positioned such that forces need to be resisted on only one side of the cargo, just one load securing device could be employed, or more than one, just that all devices would be on the same side of the cargo. This may occur if the load is against an immovable structure such as a wall, wherein the wall would resist movement of the load. In such a scenario, the only requirement would be the ability to secure the free end of the belt for tensioning purposes.

As such an invention has been disclosed in terms of preferred embodiments thereof, which fulfills each and every one of the objects of the invention as set forth above, and provides an improved device and method for securing loads during transport.

Of course, various changes, modifications and alterations from the teachings of the present invention may be contemplated by those skilled in the art without departing from the intended spirit and scope thereof. It is intended that the present invention only be limited by the terms of the appended claims.

I claim:

1. A method of securing stacked items on a carrier comprising:

a) providing at least first and second loads, the first load placed on a carrier surface, with the second load stacked on the first load, a space existing between the first and second loads;

b) positioning at least one first load resisting member against one side portion of each load, and securing the at least one first load resisting member to the carrier via a first flexible member, one end of the first flexible member attached to the at least one first load resisting member, with the other end secured to the carrier, the first flexible member passing through the space; and, optionally

c) positioning at least one second load resisting member against the other side portion of each load, and securing the at least one second load resisting member to the carrier via a second flexible member, one end of the second flexible member attached to the at least one second load resisting member, with the other end secured to the carrier, the second flexible member passing through the space.

2. The method of claim 1, wherein a number of first and second loads are placed on the carrier, each of the first and second loads secured according to steps (b) and, optionally (c).

3. The method of claim 1, wherein first, second, and third loads are stacked on the carrier surface, at least one third load resisting member contacting one side portion of the second and third loads, and being secured to the carrier using a third flexible member, one end of the third flexible member attached to the at least one third load resisting member, with the other end secured to the carrier, the third flexible member passing through a space between the second and third loads, and optionally at least one fourth load resisting member contacting the other side portion of the second and third loads, and being secured to the carrier using a fourth flexible member, one end of the fourth flexible member attached to the at least one fourth load resisting member,

with the other end secured to the carrier, the fourth flexible member passing through a space between the second and third loads.

4. The method of claims 1 or 2 or 3, wherein the first and second load resisting members are employed.

5. The method of claim 3, wherein the third and fourth load resisting members are employed.

6. The method of claims 1-5, wherein the side portions of the loads are either lateral side portions or front and back side portions.

7. A load securing device for securing items placed on a carrier comprising:

- a) a load resisting member having a body with a pair of load bearing surfaces;
- b) a flexible member, one end of the flexible member secured to a central portion of the body of the load resisting member, and defining a separation of the pair of load bearing surfaces, the other end of the flexible member being free to allow attachment to the carrier and subsequent tensioning.

7. The device of claim 6, wherein the body has an elongate rib running along a length thereof, the load bearing surface being generally perpendicular to a plane of the rib.

8. The device of claim 6 or 7, further comprising a ring adapted to attach to the one end of the flexible member, the central portion of the body adapted to retain the ring thereon.

9. The device of any one of claims 6-7, further comprising a ring adapted to attach to the one end of the flexible member, the central portion of the body having a notch portion, the ring adapted to engage the notch during tensioning of the flexible member.

10. The device of claims 6-10, wherein the flexible member is one of a belt, cable, chain or the like.

11. The device of claim 9, wherein the load bearing surfaces extends over first and second portions of the body, the notch separating the first and second portions, with the first portion sized to allow the ring to pass over the first portion and engage the notch.

12. The device of claim 11, wherein the second portion is sized larger than the first portion to create a stop for the ring.

13. A method of securing stacked items on a carrier, comprising the steps of

a) providing a load resisting member having a body with a pair of load bearing surfaces; and a flexible member, one end of the flexible member secured to a central portion of the body of the load resisting member, the other end of the flexible member being free;

b) providing at least two loads stacked vertically on a carrier;

c) positioning the flexible member between a space created by the two stacked loads;

d) attaching the free end of the flexible member to the carrier; and

e) tensioning the flexible member so that each load bearing surface of the body contacts a respective side portion of each load to resist forces applied in the direction of the load resisting member.

14. The method of claim 13, wherein a number of load resisting members are used horizontally.

15. The method of claim 13, wherein the stacked loads comprise at least three loads stacked vertically to create a pair of spaces, wherein steps (a), (c), (d), and (e) are performed using each space.

16. A load securing device comprising:

a) a body having a load bearing surface extending over first and second body portions, respectively;

b) a rib running along a length of the body and extending in a direction generally parallel to the load bearing surfaces of the first and second body portions; and

c) a notch formed between the first and second body portions, the notch adapted to engage a ring so that the ring is secured to the body between the first and second portions of the body, the ring adapted to attach to one end of a flexible member for securing load using the load bearing surfaces.

17. The device of claim 16, wherein the notch divides the body so that the first body portion is more than half a length of the body.

18. The device of claim 16, wherein the body is elongated.

19. The device of claim 16, wherein the load bearing surface of the first portion of the body has a width less than a width the load bearing surface of the second portion, and a first segment of the rib aligned with the first portion has a width less than a width of a second segment of the rib aligned with the second portion, the differences in width creating a stop between the first and second portions and allowing the ring to slide over the first portion and first segment and reach the notch, the stop limiting rotation of the ring.

20. The device of claim 19, wherein the first and second portions and/or the rib include openings therein.

21. The device of claim 16, wherein the load bearing surface includes one or more protrusions to increase grabbing power of the surface when contacting cargo.

22. A load securing device comprising:

a) a body having load bearing surfaces extending over first and second body portions,

b) a rib running along a length of the body and extending in a direction generally parallel to the load bearing surfaces of the first and second body portions; and

c) means for securing a ring between the first and second body portion, the ring adapted to attach to one end of a flexible member for securing loads using the load bearing surfaces.

### Abstract

A load securing device for stacked cargo comprises a body member having contact surfaces adapted to engage a side portion of each of a pair of stacked cargo items. One end of a flexible member such as a strap is attached to the body member. The flexible member extends through a space created between the stacked items, with its other end is secured to a carrier supporting the stacked items. Optimally, and when expecting forces to be applied to both sides of the stacked items, a load securing device is placed on either side of the stacked items so that forces arising during the transport of the stacked items are resisted in both directions.

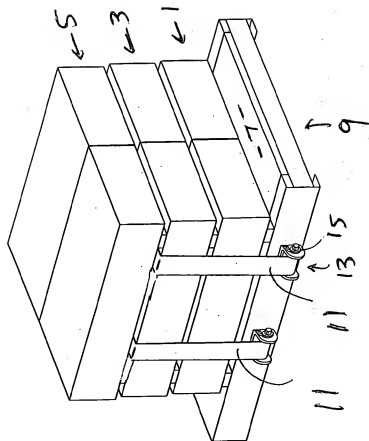


Fig. 1 PRIOR ART



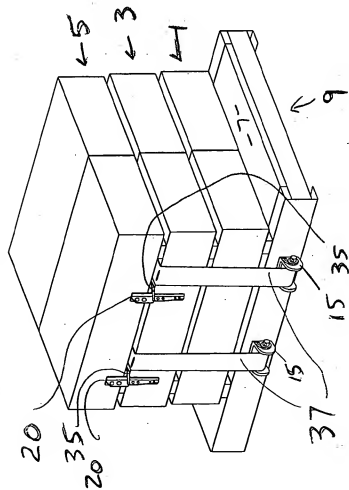


Fig. 2

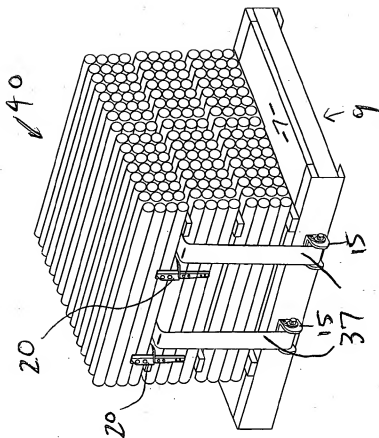


Fig. 3

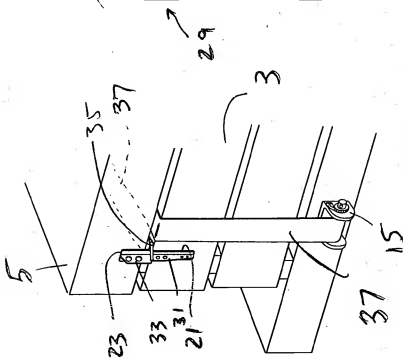


Fig. 4

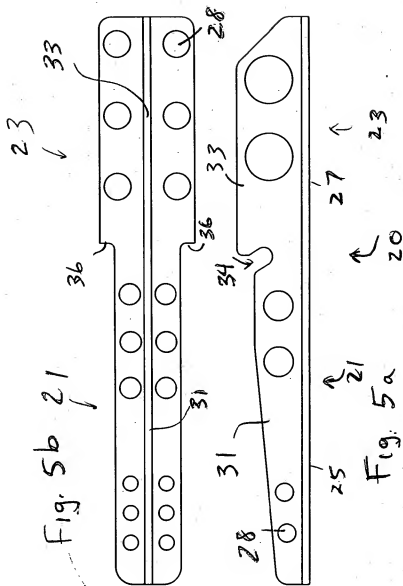


Fig. 5b

Fig. 5a

